What is claimed is:

1. An optical communication method comprising the steps of:

at a transmitting side, generating laser light, simultaneously oscillated at a plurality of wavelengths, the total number of generated photons being constant, and transmitting a signal light comprising identical data which has been added to the light of the plurality of wavelengths; and

at a receiving side, selecting light, simultaneously oscillated at the plurality of wavelengths, from the signal light, and demodulating the data.

2. The optical communication method as described in Claim 1, wherein

at the transmitting side, the light which is simultaneously oscillated at the plurality of wavelengths is generated in a plurality of groups, the groups being multiplexed and transmitted along optical fibers or in space; and

at the receiving side, one group is selected from the plurality of groups, and light at a plurality of wavelengths in the selected group is simultaneously detected directly by a single optical detector, thereby demodulating the data.

3. The optical communication method as described in Claim 1, wherein the laser light comprises light in simultaneously oscillated single peak modes, the statistical distribution of photons in each mode complying with thermal distribution, and has statistical distribution such that the total number of photons in the sum of the modes is constant.

4. The optical communication method as described in Claim 3, wherein the thermal

distribution is Bose-Einstein distribution or a composite Poisson distribution, and the statistical distribution wherein the total number of the photons is constant is Poisson distribution.

5. The optical communication method as described in Claim 1, wherein

transmitting along a plurality of equidistant paths which differ for each wavelength, or each bundle of wavelengths, comprising the signal light; and

at the receiving side, multiplexing the light, which was transmitted along the paths, selecting light which simultaneously oscillates at the plurality of wavelengths and directly detecting it by using the single optical detector, thereby demodulating the data.

6. The optical communication method as described in Claim 5, wherein the paths run in opposite directions on a ring-shaped transmission path.

7. The optical communication method as described in Claim 1, wherein, at the transmitting side, the strengths of the light at the plurality of wavelengths are equal.

8. A laser oscillator which outputs laser light oscillated simultaneously at a plurality of wavelengths, the total number of generated photons being constant.

9. The laser oscillator as described in Claim 8, comprising:

an optical negative feedback element; and

a plurality of band pass filters which are connected to the optical negative feedback element and have different transmission center wavelengths, wherein

single peak modes matching the transmission center wavelengths of the band pass filters being oscillated simultaneously, the statistical distribution of photons in each mode complying with thermal distribution, and the total number of photons of the sum of the plurality of modes being constant.

10. The laser oscillator as described in Claim 9, the optical negative feedback element comprising a semiconductor light amplifier having gain saturation characteristics.

11. The laser oscillator as described in Claim 9, wherein the laser oscillator being a ring resonator which uses an optical fiber, and further comprising:

a divider which divides the optical path of the ring resonator into a plurality of branches at a predetermined location, and outputs the divided light to the band pass filters; and

a coupler which multiplexes transmitted light from the band pass filters, and couples the multiplexed light to one optical fiber; and wherein

the laser oscillator simultaneously oscillating laser light in a plurality of different wavelength modes within the ring resonator.

12. The laser oscillator as described in Claim 9, further comprising

a plurality of variable optical attenuators, which are provided at each branch and attenuate light, transmitted along each branch; and

a control circuit which adjusts the variable optical attenuators so as to equalize the optical strengths of transmission center wavelengths of each band pass filter.

13. The laser oscillator as described in Claim 11, wherein a polarization controller, which aligns the polarization planes of the branches by adjusting the polarization planes of each branch, is provided in the ring resonator.

14. The laser oscillator as described in Claim 11, wherein the optical fibers, which form the ring resonator, comprise polarization-maintaining fibers, the polarization state of the polarization-maintaining fibers being adjusted so as to maximize the optical output of the laser resonator.

15. The laser oscillator as described in Claim 11, further comprising a polarization controller which matches the polarization plane of light, which is transmitted on the optical fibers, to the polarization plane of the optical negative feedback element.

16. The laser oscillator as described in Claim 9, wherein the laser oscillator comprising a spatial ring resonator which uses mirrors, and further comprising:

a divider which divides the optical path of the spatial ring resonator into a plurality of branches at a predetermined location, and outputs the divided light to the band pass filters; and

a coupler which multiplexes light, transmitted from the band pass filters, and wherein

the laser oscillator simultaneously oscillating laser light in a plurality of different wavelength modes within the spatial ring resonator.

17. The laser oscillator as described in Claim 16, further comprising a plurality of

variable optical attenuators, which are provided at each branch and attenuate light transmitted along each branch, thereby equalizing the optical strengths of the transmission center wavelengths of the band pass filters.

18. The laser oscillator as described in Claim 9, wherein the laser oscillator comprises a Fabry-Perot resonator which uses mirrors and half-mirrors, and the laser oscillator further comprising

a coupler which divides the optical path of the Fabry-Perot resonator into a plurality of branches at a predetermined location, and outputs the divided light to the band pass filters, and multiplexes the light transmitted from the band pass filters, and wherein

the laser oscillator simultaneously oscillating laser light in a plurality of different wavelength modes within the Fabry-Perot resonator.

19. The laser oscillator as described in Claim 18, further comprising a plurality of variable optical attenuators, which are provided at each branch and attenuate light transmitted along each branch, thereby equalizing the optical strengths of the transmission center wavelengths of the band pass filters.

20. A transmitter comprising:

a plurality of laser oscillators which output laser light oscillated simultaneously at a plurality of wavelengths, the total number of generated photons being constant;

a plurality of optical modulators which add identical data to the laser light, output by the plurality of laser oscillators, and output optical signals; and

a coupler which multiplexes the plurality of optical signals, output by the plurality

of optical modulators, and transmits a wavelength-multiplexed signal.

21. The transmitter as described in Claim 20, further comprising a separator which separates wavelength components, comprising the wavelength-multiplexed signals output by the coupler, so that a plurality of wavelengths, oscillated simultaneously by each individual laser oscillator, all belong to different wavelength groups; and

a plurality of couplers which generate a plurality of wavelength-multiplexed signals by multiplexing light from each of the wavelength groups, and transmit the multiplexed light to transmission paths corresponding to the wavelength-multiplexed signals.

22. A receiver comprising:

selectors which receive wavelength-multiplexed optical signals from a transmission path, the optical signals being transmitted by adding identical data to a plurality of laser lights oscillating simultaneously at a plurality of wavelengths, the total number of generated photons being constant, and select combinations of a plurality of simultaneously oscillated wavelength components from the wavelength components contained in the optical signals;

a coupler which multiplexes light of the selected combinations of a plurality of simultaneously oscillated wavelength components; and

demodulators which demodulate data by directly detecting the multiplexed light.

23. The receiver as described in Claim 22, wherein the optical signals are transmitted on different transmission paths for each of the plurality of wavelength groups, so that a

plurality of simultaneously oscillated wavelengths all belong to different wavelength groups, and further comprising

a coupler which multiplexes the optical signals, transmitted along the transmission paths, and outputs to the selectors.

24. The receiver as described in Claim 22, further comprising a plurality of polarization controllers which adjust the polarization planes of light at the plurality of wavelengths, selected by the selectors.

25. The receiver as described in Claim 22, further comprising a plurality of delay circuits which delay the light of the plurality of wavelength components, selected by the selectors.

26. An optical communication system comprising:

a transmitter which generates laser light by using a laser resonator, which generates photons by stimulated emission centering on a plurality of windows, provided on a wavelength axis, the transmitter comprising an optical negative feedback element for keeping the total number of generated photons constant, and using an optical modulator to add data to the laser light and transmit a signal light;

a transmission path which the signal light, transmitted from the transmitter, is transmitted along; and

a receiver which receives the signal light from the transmission path, and demodulates the data based on an optical signal having wavelength components corresponding to the plurality of windows contained in the signal light.

27. The optical communication system as described in Claim 26, wherein the transmitter comprises a plurality of the laser oscillators and a plurality of the optical modulators, and transmits the signal light obtained by multiplexing a plurality of optical signals, output by the plurality of optical modulators; and

the receiver selects a plurality of wavelength components corresponding to the plurality of windows, set at each individual laser oscillator, from wavelength components contained in the signal light, and demodulates the data based on an optical signal obtained by multiplexing the plurality of wavelength components.

28. The optical communication system as described in Claim 27, wherein

a plurality of transmission paths is provided, and

the transmitter separates the wavelength components, comprising the wavelength-multiplexed signal, into a plurality of wavelength groups so that the wavelengths corresponding to the plurality of windows, which are set at each individual laser oscillator, all belong to different wavelength groups, transmits a plurality of wavelength-multiplexed signals obtained by multiplexing the wavelength components of each wavelength group to the corresponding transmission paths; and

the receiver multiplexes the wavelength-multiplexed signals, transmitted along the transmission paths, and receives the multiplexed light as the signal light.

29. The optical communication system as described in Claim 26, wherein the optical communication system comprises a ring network of nodes which are connected in a ring, the node being provided with at least one of the transmitter and the receiver;

the nodes provided with the transmitter transmitting wavelength components, contained in the signal light, to transmission paths provided in opposite directions on the ring network; and

the nodes provided with the receiver extracting all wavelength components which correspond to the plurality of windows set at an identical laser oscillator from the light of the wavelength components passing around the ring network, and demodulating the data.

30. The optical communication system as described in Claim 26, wherein the optical communication system comprises a star network comprised of a plurality of nodes provided with the transmitter and the receiver, and a distributing device which distributes the signal light, transmitted via the transmission paths from the nodes, to all the nodes via the transmission paths;

the transmitter transmitting a signal light containing a plurality of wavelength components, which are unique to the nodes which the transmitter belongs to, to the distributing device; and

the receiver extracting light of wavelength components, which correspond to the plurality of windows set at an identical laser oscillator, from the light of the wavelength components contained in the signal light, distributed from the distributing device, and demodulating the data.